Claims

What is claimed is:

1. A filter device for an engine and operable to support a filter element, the filter device comprising:

a housing defining a filter receiving space having a first end and a second end, the first end and second end defining an axial length therebetween; and

a biasing element integrally-formed as one piece with the housing and disposed adjacent the first end.

2. The filter device of claim 1, wherein the housing includes a first portion having a first engagement portion and a second portion having a second engagement portion.

3. The filter device of claim 2, wherein the first engagement portion includes tabs, and the second engagement portion includes slots sized to receive the tabs and interconnect the first portion to the second portion.

4. The filter device of claim 1, wherein at least one of the first end and the second end includes a radial retainer positioned to inhibit radial movement of the filter element.

5. The filter device of claim 1, wherein the biasing element includes a leaf spring formed as part of the housing, the leaf spring deflecting in response to contact with the filter element.

6. The filter device of claim 1, wherein the biasing element is formed as part of a top portion of the housing, and wherein the top portion deflects in response to contact with the filter element.

7. The filter device of claim 1, wherein the filter element is positioned within the filter receiving space such that the biasing element deflects to sandwich the filter element between the biasing element and the second end.

8. The filter device of claim 1, further comprising a filter element including a pleated filter media sandwiched between a first end cap and a second end cap.

9. The filter device of claim 8, wherein the first end cap is in contact with the biasing element and the second end cap is in contact with the second end such that the filter element and housing cooperate to define an unfiltered space and a filtered space.

10. The filter device of claim 9, wherein the housing includes a first aperture and a second aperture, the first aperture positioned to direct air from outside of the housing into the unfiltered space within the housing, and the second aperture positioned to receive air from the filtered space and direct the air out of the housing.

11. The filter device of claim 1, wherein the biasing element is integrally-formed with a bottom portion of the housing and wherein the bottom portion deflects in response to contact with the filter element.

12. The filter device of claim 1, wherein the housing is injection molded.

13. The filter device of claim 1, wherein the biasing element includes a cantilevered annular ring member.

14. The filter device of claim 1, wherein the housing includes a cover and the biasing element is formed integral with the cover.

15. The filter device of claim 14, wherein the cover includes at least one slot that at least partially defines the biasing element.

16. An air cleaner assembly for an engine, comprising:

a base including a filter support and a base engagement portion;

a filter element defining a longitudinal direction;

a cover including an integrally formed biasing element and a cover engagement portion, the base engagement portion interconnected with the cover engagement portion to position the biasing member adjacent the filter element to bias the filter element in the longitudinal direction.

17. The air cleaner assembly of claim 16, wherein the cover engagement portion includes at least one tab, and the base engagement portion includes at least one slot sized to receive the tab and to interconnect the cover portion to the base portion.

18. The air cleaner assembly of claim 16, wherein the biasing element includes a leaf spring formed as part of the cover, the leaf spring deflecting in response to contact with the filter element.

19. The air cleaner assembly of claim 16, wherein the biasing element is formed as part of a top portion of the cover.

20. The air cleaner assembly of claim 16, wherein the filter element includes a pleated filter media sandwiched between a first end cap and a second end cap.

21. The air cleaner assembly of claim 20, wherein the first end cap is in contact with the base and the second end cap is in contact with the biasing element such that the filter element, the cover, and the base cooperate to define an unfiltered space and a filtered space.

22. The air cleaner assembly of claim 21, wherein the cover includes a first aperture positioned to direct air from outside of the assembly into the unfiltered space, and wherein the base includes a second aperture positioned to receive air from the filtered space and direct the air out of the assembly.

23. The filter assembly of claim 16, wherein the biasing element is integrally-formed with a bottom portion of the base and wherein the bottom portion deflects in response to contact with the filter element.

24. The filter assembly of claim 16, wherein the base and cover are injection molded.

25. The filter assembly of claim 16, wherein the biasing element includes a cantilevered annular ring member.

26. The filter assembly of claim 16, wherein the cover includes at least one slot that at least partially defines the biasing element.

27. The filter assembly of claim 16, wherein the base engagement portion and the cover engagement portion are holes sized to receive a bolt.

28. A cover for use with an engine filter base and a filter element, the cover comprising:

a shell;

a biasing element integrally-formed as one piece with the shell;

an attachment portion connected to the shell and adapted to be interconnected to the filter base such that the filter element is sandwiched between the biasing element and the filter base.

29. The cover of claim 28, wherein the shell includes at least one aperture.

30. The cover of claim 28, wherein the shell, biasing element, and attachment member are injection molded as a single component.

31. The cover of claim 28, wherein the biasing element includes a leaf spring.

32. The cover of claim 28, further comprising a slot that at least partially defines the biasing element.

33. The cover of claim 32, further comprising a second slot disposed a distance from the first slot, the first slot and second slot cooperating to at least partially define the biasing element.

34. The cover of claim 28, wherein the attachment portion includes a tab, and the base includes a slot adapted to receive and engage the tab.

35. The cover of claim 28, wherein the attachment portion includes a slot, and the base includes a tab, the slot adapted to receive and engage the tab.

36. The cover of claim 28, wherein the cover further includes a second attachment portion.

37. The cover of claim 28, wherein the biasing member applies a force to the filter element, the force biasing the filter element toward the base.

38. The cover of claim 28, wherein the cover includes a first aperture positioned to direct air from outside of the cover into the unfiltered space within the cover.

39. The cover of claim 28, wherein the attachment portion is a hole sized to receive a bolt.

40. The cover of claim 28, wherein the attachment portion includes a cantilevered tab member integrally formed as part of the shell.